group consisting of: the general indoor environment, general outdoor environment, a process environment, and equipment environment.

118. (New) A method according to claim 96, wherein said sample is a cell, plurality of cells, tissue, components thereof, and combinations thereof.

REMARKS

Attached hereto is a marked-up version of the changes made to the claims by the current amendment. The attached pages are captioned "**Version with Markings to Show Changes Made**."

Claims 1-65 are currently pending; claims 22-65 have been withdrawn from consideration in accordance with a restriction requirement. Claims 1-21 have been examined in the present Office Action. By this Amendment, claims 66-118 have been added. Applicants maintain that new claims 66 to 118 are fully supported in the specification, are consistent with the restriction requirement made final by the Examiner, and do not represent new matter. In accordance with this Amendment, claims 1-21 and 66-118 are now under examination. All of these claims are directed to a method of analyzing samples using deposited thin films.

Claims 1-3 and 6-21 have been amended for purposes of clarification of the invention. It is respectfully submitted that the amendment of these claims is neither narrowing nor made for substantial reasons related to patentability.

The Applicants have amended the Specification as requested by the Examiner to include the reference of this application as a continuation-in-part of U.S. Application No. 09/580,1055, now U.S. Patent No. 6,399,107, and the four Provisional Applications from which priority benefit is claimed.

The Examiner has objected to Fig. 15 in that the title erroneously contains a reference to Fig. 4. Enclosed with this Amendment is a new set of drawings which correct the defect noted by the Examiner in Fig. 15.

The Examiner correctly objected to the oath/declaration as defective in that the citizenship of one of the inventors, Joseph Cuiffi, was not identified. Enclosed with this Amendment is an oath/declaration executed by Mr. Cuiffi indicating that he is a citizen of the United States.

I. The Examiner's Rejections.

Claims 1-21 stand rejected under 35 U.S.C. §112, first paragraph as containing subject matter which was not described in the specification in such a way as to enable one skilled in the relevant art to practice the invention commensurate with the scope of the claims. Specifically, the Examiner alleges that the specification is enabling for analyte detection by laser desorption/ionization time of flight mass spectroscopy, but is not enabled for "analysis" of all possible "samples" by all possible "detection means". The Examiner raised questions directed to the structures, sample parts, contents of the sample, multiple analytes of a sample, label(s), and involvement of a binding partner.

Claims 1-21 stand rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 1 is rejected under 35 U.S.C. §102(b) as being anticipated Bogart. (U.S. Pat. No. 5,552,272). Claim 1 is also rejected under 35 U.S.C. §102(b) as being anticipated by Dale *et al.* [Anal. Chem. 68(19):3321-3329, 1996]

Claims 1-13 and 17-21 are rejected under 35 U.S.C. §103(a) as being unpatentable over Bogart. (U.S. Patent No. 5,552,272) in view of Ebersole *et al.* (U.S. Pat. No. 5,658,732). Also, claims 1-21 are rejected under 35 U.S.C. §103(a) as being

unpatentable over Dale *et al.* [Anal. Ch m. 68(19):3321-3329, 1996] in view of Eb rsole *et al.* (U.S. Pat. No. 5,658,732).

In considering claims under 35 U.S.C. §103(a) the Examiner presumed that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made. The Examiner is correct in this presumption as the subject patent application is owned in its entirety by the Penn State Research Foundation.

II. Patentability Argument.

Applicants provide the following arguments establishing that the rejections under 35 U.S.C. §§112 , 103 , 102 should be withdrawn.

A. The Rejection Under 35. U.S.C. §112, first and second paragraphs

35 U.S.C. §112, first paragraph. With reference to the rejection of claims 1-21 under 35 U.S.C. §112, first paragraph, the Applicants acknowledge the Examiner's position that the "....the specification, while being enabling for analyte detection process by laser desorption/ionization time of flight mass spectroscopy (pg. 22-38), does not reasonably provide enablement for the scope encompassed by the claims." The Examiner raises several questions regarding; "What part of the sample is being analyzed? Structures? Contents? How is the sample being detected? Does it involve a binding partner? A label? Are multiple analytes of a sample being detected at the same time or just a single analyte?

The Applicants' invention does not involve a binding partner (such as the matrix commonly used with mass spectroscopy), and can analyze various analytes of a sample. Mass spectroscopy is a preferred embodiment of Applicants' invention. As the Examiner is aware, mass spectrometry is a method for producing an ionized species and analyzing the ionized species according to its mass/charge ratio. Accordingly, what

is detected in mass spectroscopy is the mass to charge ratio which usually allows determination of th analyte mass. Th methods by which the ionized species are formed are varied and range from thermal ionization to ion bombardment. Matrix-less laser desorption/ionization utilizing deposited thin films is a novel method of desoroption and ionization which this invention discloses and describes. The methods by which the ionized species are detected are also varied, i.e., time of flight, ion trap, quadrapole and magnetic sector devices are common. In laser desorption/ionization, all the components of a common mixture are ionized and desorbed at one time point, concurrent with the light pulse, so they may be analyzed at the same time. Other means of sample analysis disclosed by Applicants, i.e., antigen-antibody recognition reaction techniques, will selectively identify a sample component.

The Applicants gratefully acknowledge the Examiner's position regarding the enablement of the invention using mass spectroscopy, but respectfully contend that the invention discloses and enables detection means other than mass spectroscopy. While mass spectroscopy is a preferred embodiment, various detection means, including but not limited to light desorption mass spectroscopy, are disclosed (c.f., p. 10, lines 8-16 of the specification). The detection means claimed by Applicants are commonly used in the art and their adaptation to sample analysis is routine. For example, the Applicants note (c.f. p. 10, lines 12 & 13) the use of dye or coloring means in chemical detection means involving colorimetry or visualization. Disclosure of the various detection means of the invention enables those skilled in the art to practice the invention. All of the disclosed detection means are used extensively in commerce and their application is routine. The Applicants believe that the rejection under 35 U.S.C. §112, first paragraph, should properly be withdrawn.

35 U.S.C. §112, second paragraph. Concerning the rejection under 35 U.S.C. §112, second paragraph, the Applicants have amended claims and added new claims so as to define and particularly point out the subject matter which Applicants regard as the invention. In overview, the Applicants have invented a method for the analysis of various samples (c.f., p. 9 of the specification) by various detection means (c.f., p. 10 of

the specification) using three different types of deposited thin films (continuous, columnar, and columnar-void; present d in Table I, p. 8 of the specification.

The Applicants have amended claims so as to clarify the subject matter of the invention and to address issues noted by the Examiner including "sample", "analysis of a sample". The "analysis of a sample" (found in independent claims 1, 71, and 95) is now specified by the present amendment with respect to the particular type of deposited thin film [c.f., subparagraph (a) of claims 1, 71 & 95] and the analysis methodology [c.f., subparagraph (b) of claims 1, 71, and 95]. With reference to the "sample" and its "analysis", a wide variety of organic and inorganic samples are disclosed in the specification that may be analyzed for their chemical constituents using deposited thin films and various detection means. The results obtained from the various detection means (i.e., mass spectroscopy) are well known in the art.

The Examiner's objection to claim 1 as vague and indefinite is believed overcome by the inclusion of the type of deposited thin film (continuous thin film) and the type of analysis (radiation-driven desorption-ionization mass spectroscopy). Claim 1 now contains a method step in the detection or analysis of the sample.

The Examiner questioned in reference to claim 1, whether a binding partner, signal or labeling was involved. The analysis by mass spectroscopy does not involve a binding partner (i.e., a matrix) or any special additive to the sample. Part of the novelty of Applicants' invention is the omission of any such matrix, a long-standing limitation in the art.

The Examiner has objected to improperly written Markush language in several claims (i.e, claims 2, 3, 4 and 19). The objection to claim 4 is moot in that this claim is cancelled and the remaining claims have been corrected to overcome this objection.

The Examiner remarked that the correlation of claims 5-6 with claim 1 was unclear regarding "substrate" and "continuous void". Claim 5 has been cancelled.

Claim 6 has been amended to now r fer to the types of deposited continuous thin films of the method of claim 1. The ref rence to "continuous void" is now found in n w claim 74, which depends from claim 71, where the deposited columnar-void film comprises (a) a network of columnar-like units in a continuous void; and (b) a substrate to which the network of columnar-like units is adhered. The "continuous void" does not pertain to the position of the sample, but refers to the void between the columnar-like units of this novel deposited thin film (now U.S. Patent No. 6,399,107). The novel columnar-void thin film is able to "hold" samples for analysis. The Examiner questioned whether the sample reacts with the "substrate"? The samples need not react with the substrate on which the thin film is deposited.

The Examiner remarked that the correlation between claim 8 with regard to the analysis of sample of claim 1 was unclear. Claim 8 has been cancelled. However, the substance of claim 8 is now found in new claim 77. This claim refers to the various deposition parameters (i.e., plasma power etc.) that may be used to modify plasma deposited columnar-void thin film prior to its use in the method of the invention.

Claims 10 and 11 as presently amended are believe to have a proper antecedent for "film".

The Examiner questioned whether the deposited film of claims 19-21 is the same as the deposited thin film of claim 1? Yes, the deposited thin film of the separation means of claims 19-21 is the same as the deposited thin film used for analysis of sample in claim 1.

With reference to the Examiner's question regarding "electrical separation means" in claim 18 and "separation means" of claim 19, the "electrical separation means" refers to electrically mediate chromatographic separation means. Claim 19, as presently amended, is now a Markush group of several "chemical, physical or electrical separation means" with antecedent in claim 18 of "chemical, physical, or electrical

separation m ans". Th Applicants beli v that the rej ction under 35 U.S.C. §112, second paragraph, should prop rly be withdrawn.

Pending claims as amended are believe to address and overcome the rejection under 35 U.S.C. §112. Accordingly, removal of this rejection is respectfully requested.

B. The Rejection Under 35 U.S.C. §103

Claims 1-13 and 17-21 are rejected under 35 U.S.C. §103(a) as being obvious and unpatentable over Bogart. (U.S. Patent 5,552,272) in view of Ebersole *et al.* (U.S. Pat. No. 5,658,732). Also, claims 1-21 are rejected under 35 U.S.C. §103(a) as being obvious and unpatentable over Dale *et al.* [Anal. Chem., 68(19):3321-3329] in view of Ebersole *et al.* (U.S. Pat. No. 5,658,732). This rejection is in error.

It is the Applicants' position that the claims are not made obvious either by (i) the Bogart patent in view of the Ebersole *et al.* patent or by (ii) Dale *et al.* in view of the Ebersole *et al.* patent Matsuda *et al.* The Examiner holds the position that it would be obvious to one of ordinary skill in the art to use these teachings. Applicants respectfully disagree. A *prima facie* case of obviousness must have some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or combine reference teachings, a reasonable expectation of success, and the art reference or combined references must teach or suggest all the claim limitations. As will become apparent from the discussion below, the cited art applied by the Examiner does not disclose the parameters of the claimed process. Also, there is no suggestion or motivation in either the references or general knowledge of those of ordinary skill in the art to fill the significant "gaps" in the cited art to arrive at Applicants' invention.

The teaching of Bogart is clearly directed to a method of optical detection (i.e. an "optical reader" in the form of an ellipsometer, a reflectometer, a comparison

ellipsometer, a profilometer or a thin film analyzer). Bogart measures only the thickness of samples on a film. Bogart teaches a method of optical detection using a reflective surface, a polymeric analyte support layer, and a fluorescent tag to interrogate the amount of an analyte of interest. The present invention does not measure thickness of a sample, or even employ "optical readers" as a means of sample analysis.

Dale *et al.* describes a method of combining graphite and liquid matrix in a slurry with the analyte or sample and applying this mixture to a target for analysis by laser desorption/ionization mass spectroscopy. In contrast, the present invention uses a solid deposited thin film with light adsorbing properties (i.e., germanium) and directly applies sample to the film. The present invention does not require a light-adsorbing matrix, as taught and required by Dale *et al.* Applicants' invention is a major advance in the art which obviates the use a matrix. The present invention does not in any way use matrix assisted laser desorption-ionization (i.e., MALDI) technology. Dale does not teach or suggest the use of a deposited thin film for laser desorpotion/ionization mass spectroscopy. Dale uses a graphite/matrix slurry mixed with sample and applied in a macroscopic drop to a metal substrate. In direct contrast, the present invention uses a nanometer/micrometer scale layer of deposited solid thin film as the means for sample support, light absorption/desorption and ionization of sample. In fact, the Examiner will note that Dale should not properly even be called use of a thin film (generally defined in the art as microns or less). Dale uses macroscopic material in contrast to Applicants' invention.

With regard to Ebersole *et al.*, the Examiner remarks that this patent "...disclosed a columnar-void film used as a biosensor detector..." This characterization of this art is incorrect. Ebersole *et al.*, does not teach or disclose the use of columnar/void film for any purpose, let alone use of columnar/void film as a biosensor. This patent teaches only piezo-electric oscillators. Ebersole *et al.* is using a piezo-electric oscillator as a method for determining changes in oscillation frequency when analytes are absorbed. The present invention does not propose to use this as a method of detection.

The cited art combinations (i. ., Bogart in vi w of Ebersol ; Bogart in view of Dale), do not arrive at Applicants' inv ntion, abs nt the teaching of the present invention. Hindsight reconstruction of Applicants' invention is improper and in fact has not been achieved.

In light of the discussion of art as related to the present invention, the Applicants respectfully submit that the prior art does not either suggest or describe Applicants' invention. In addition, there is no suggestion or motivation, either in the Matsuda *et al.* or Okano *et al.* references or in the general knowledge of those skilled in the art, to modify any reference or combination of references with a reasonable expectation of success to arrive at the claimed invention. There is no teaching or suggestion of the limitations of the instant claims. Applicants' claimed method is not only novel but unobvious. Accordingly, the Applicants request that the rejection under 35 U.S.C. §103(a) as applied to pending claims should appropriately be withdraw.

C. The Rejection Under 35 U.S.C. §102.

The Examiner has rejected claim 1 under 35 U.S.C. §102(b) as anticipated by Bogart (U.S. Pat. No. 5,552,272). The present invention is not anticipated by Bogart. As discussed above in connection with the rejection under 35 U.S.C. §103(a), the teaching of Bogart is directed to a method of optical detection, whereas Applicants' claim 1, as amended, uses desorption-ionization mass spectroscopy. Bogart measures the thickness of samples using a method of optical detection involving a reflective surface, a polymeric analyte support layer, and a fluorescent tag to interrogate the amount of an analyte of interest. In contrast, the method of claim 1 does not measure thickness of a sample, or employ "optical readers" as a means of sample analysis. Bogart and the present invention are quite different processes. The Bogart patent is clearly distinguishable from the present invention. The rejection under 35 U.S.C. §102(b) should be withdrawn.

In addition, the Examiner has rejected claim 1 under 35 U.S.C. §102(b) as anticipat d by Dal *et al.* [Anal. Ch m., 68(19):3321-3329]). The pres nt invention is not anticipated by this art. As discussed above in connection with the rejection under 35 U.S.C. §103(a), Dale *et al.* describes a MALDI technique. It teaches a method of combining graphite and liquid matrix in a slurry with the analyte or sample and thereafter analyzing this matrix-analyte mixture by laser desorption/ionization mass spectroscopy. In contrast, the present invention uses a deposited thin film and does not require a light adsorbing matrix as does Dale *et al.* Applicants' invention using thin films without the use of a matrix is a significant advance in the art. The present invention does not in any way use MALDI technology. Dale does not teach or suggest the matrix-less use of a deposited thin film with laser desorpotion/ionization mass spectroscopy or any other analyzing methodology . Dale uses a graphite/matrix slurry mixed with sample and applied in a macroscopic drop to a metal substrate. The present invention uses a nanometer/micrometer scale layer of deposited solid thin film as the means for analyte support, light absorption/desorption and ionization of sample. Dale is not thin film art (generally defined in the art as microns or less). Dale uses macroscopic material. Dale is clearly distinguishable from the present invention and certainly does not contain the elements of claim 1 as amended. The rejection under 35 U.S.C. §102(b) should be withdrawn.

Conclusion.

The present invention represents a new and unobvious method for sample analysis using deposited solid thin film. Amended and newly presented claims directed to the method of the invention are believed to satisfy statutory conditions of patentability. Applicants have submitted new claims 66-118 to further describe their method and define over the prior art. The amended and new claims under examination are offered to more particularly point out and distinctly claim the subject matter which Applicants regard as the invention.

In view of the above remarks responsive to the subject Office Action, the Applicants believe that the rejections under 35 U.S.C. §§103, 102, and 112 should be withdrawn. The claims as currently presented distinguish from the art references and represent patentable subject matter. Reconsideration and allowance, being in order, are earnestly solicited. Should there be further issues, the undersigned would welcome a telephone call to facilitate their resolution.

Respectfully submitted

DATE: July 15, 2002

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

In the Claims:

Claims 1-65 were originally filed. Claims 22-65 are withdrawn from consideration subject to a restriction requirement. Claims 4, 5, 8, and 13 have been cancelled. Claims 1-3, 6-7, 9-12, and 14-21 have been amended. New claims 66-118 have been added.

The claims have been amended as follows:

1. (Amended) A method for the analysis of a sample comprising:

(a) applying a sample [to] on a deposited continuous thin film; and

(b) analyzing said sample by [a detection means] radiation-driven desorption-ionization mass spectroscopy.

2. (Amended) A method according to [Claim] claim 1, wherein said sample is selected from the group consisting of: organic chemical compositions, inorganic chemical compositions, biochemical compositions, drugs, drug metabolites, cells, cell material, micro-organisms, peptides, polypeptides, proteins, lipids, carbohydrates, nucleic acids, [or] and [mixtures] combinations thereof.

3. (Amended) A method for sample analysis according to [Claim] claim 2, further comprising [wherein] obtaining said sample [is obtained] from the group consisting of: a fluidic system, a micro fluidic system, a nano fluidic system, a micro chromatographic system, a nano chromatographic system, a high-throughput isolation and preparation system, [or] and combinations thereof.

6. (Amended) A method according to [Claim 5] claim 1, wh rein said [substrate] deposited thin film is [a solid phase composition comprising silicon] sel cted from the group consisting of: semiconductors, insulators, organic materials, glasses, plastics, polymers, metals, ceramics [or] and [mixtures] combinations thereof.

7. (Amended) A method according to [Claim 4] claim 1, further comprising the step of selecting said deposited continuous thin film using criteria selected form the group consisting of: electromagnetic energy reflection, electromagnetic energy absorption, sample wetting and drying, laser-light reflection, optical absorption, sample species adsorption, absorption and desorption, ambient absorption and desorption, and combinations thereof.

9. (Amended) A method according to [Claim 8] claim 1, further comprising modifying [wherein] said deposited continuous thin film prior to analyzing said sample [is subsequently modified] by oxidation, halidation, silicidation, etching, ion implantation, hydrogen implantation, nitridization, [or] and [mixture] combinations thereof.

10. (Amended) A method according to [Claim 4] claim 1, further comprising , [wherein said film is] physically or chemically [modified] modifying, surface [functionalized] functionalizing, or [patterned] patterning said continuous thin film prior to analyzing said sample.

11. (Amended) A method according to [Claim] claim 10, wherein [said] patterning said continuous thin film is [patterned] by : lithography comprising photolithography, probe, contact printing, imprinting, soft lithography; stamping[,]; screen masking[,]; printing or [physical modification of] physically modifying said film or a subsequently positioned [material] sample.

12. (Amended) A method according to [Claim] claim 10 wherein said [physical or chemical modification] physically or chemically modifying comprises reaction with or

adherence with organic or inorganic compounds, cells, cell components, tissues, microorganisms and [mixtures] combinations thereof.

14. (Amended) A method according to [Claim 13] claim 1, wherein analyzing said sample is by [the detection means is] laser desorption-ionization mass spectroscopy.

15. (Amended) A method according to [Claim 14] claim1, wherein prior to [detection] analyzing said sample, a signal enhancing agent is integrated with said sample.

16. A method according to [Claim] claim 15 wherein said signal enhancing agent is ammonium citrate.

17. (Amended) A method according to [Claim] claim 1, wherein applying said sample to said continuous thin film is [applied] by either (a) [adsorption] absorbing from a solid, liquid or gas; or (b) [direct application] directly applying to the surface of said deposited continuous thin film as a solid or liquid, or combination thereof.

18. (Amended) A method according to [Claim] claim 17 wherein applying said sample [is applied] to said continuous thin film is directly from, or integrated with, a chemical, physical, or electrical separation means, or combination thereof.

19. (Amended) A method according to [Claim] claim 18 wherein said chemical, physical or electrical separation means is selected form the group consisting of liquid chromatography, gas chromatography, deposited thin film chromatography, size exclusion chromatography, affinity chromatography, gel electrophoresis, capillary or micro-capillary electrophoresis, [or] blotting, and combinations thereof.

20. (Amend d) A method according to claim 19 wherein applying said sample to said continuous thin film dir ctly from, or integrated with, a [said] deposited thin film chromatography separation means further comprises the step of:

(a) applying said sample to said deposited thin film chromatography separation means;

(b) allowing the analytes of said sample to migrate through or to interact with said deposited thin film thereby separating component analytes in said sample, and thereafter applying said analytes of said sample to said continuous deposited thin film.

21. (Amended) A method according to [Claim] claim 20 wherein the said deposited thin film is chemically or physically modified prior to [said separation] separating component analytes in said sample.

The following new claims have been added:

66. (New) A method according to claim 1, wherein said deposited continuous thin film is deposited on a substrate selected from the group consisting of silicon, semiconductors, insulators, organic materials, glasses, plastics, polymers, metals, ceramics, and combinations thereof.

67. (New) A method according to claim 1, wherein said deposited continuous thin film is deposited by chemical vapor deposition, physical vapor deposition, plasma enhanced chemical vapor deposition, hot wire deposition, nebulization, evaporation, sputtering, casting, spin coating, and combinations thereof.

68. (New) A method according to claim 6, wherein said deposited thin film is a semiconductor selected from the group consisting of silicon, germanium, or their compounds and alloys deposited on a substrate selected from the group consisting of

silicon, semiconductors, insulators, organic materials, glasses, plastics, polymers, metals, ceramics and combinations th reof.

69. (New) A method according to claim 2, wherein said sample is a gas, liquid, solid, or combination thereof found in the general indoor environment, general outdoor environment, a process environment, and equipment environment.

70. (New) A method according to claim 2, wherein said sample is a cell, plurality of cells, tissue, compontents thereof, and combinations thereof.

71. (New) A method for the analysis of a sample comprising:

(a) applying a sample on a deposited columnar/void thin film; and

(b) analyzing said sample by a detection means selected from the group consisting of radiation-driven desorption/ionization mass spectroscopy, antigen-antibody recognition reaction techniques, calorimetric detection, atomic force microscopy, spectrographic analysis, enzyme reaction detection, electrical detection, chemical detection, fluorescence detection, optical detection, radioactivity detection, and combinations thereof.

72. (New) A method according to claim 71, wherein said sample is selected from the group consisting of: organic chemical compositions, inorganic chemical compositions, biochemical compositions, drugs, drug metabolites, cells, cell components, micro-organisms, peptides, polypeptides, proteins, lipids, carbohydrates, nucleic acids, and combinations thereof.

73. (New) A method according to claim 72, further comprising obtaining said sample from a fluidic system, a micro fluidic system, a nano fluidic system, a micro chromatographic system, a nano chromatographic system, a high-throughput isolation and preparation system, and combinations thereof.

74. (New) A method according to claim 71 wherein said deposited columnar-void film comprises (a) a network of columnar-like units in a continuous void; and (b) a substrate to which said network of columnar-like units is adhered.

75. (New) A method according to claim 71, wherein said deposited columnar-void thin film is selected from the group consisting of: semiconductors, insulators, organic materials, glasses, plastics, polymers, metals, ceramics and mixtures thereof.

76. (New) A method according to claim 71 further comprising the step of selecting said deposited columnar-void thin film using criteria selected form the group consisting of: laser-light reflection, optical absorption, sample species adsorption absorption and desorption, ambient adsorption, absorption and desorption, and combinations thereof.

77. (New) A method according to claim 71, wherein said film is deposited by a plasma process and the spacing, height, physical and chemical composition of said network of columnar-like units are varied by adjustment of the deposition parameters selected from the group consisting of: voltage, current, voltage between plasma and substrate, substrate temperature, plasma power, process pressure, electromagnetic fields in the vicinity of the substrate, deposition gases and flow rates, chamber conditioning, substrate surface, and combinations thereof.

78. (New) A method according to claim 71, further comprising modifying said deposited columnar-void thin film prior to analyzing said sample by oxidation, halidization, silicidation, etching, ion implantation, hydrogen implantation, nitridization, and combinations thereof.

79. (New) A method according to claim 71, further comprising, physically or chemically modifying, surface functionalizing, or patterning said columnar-void thin film prior to analyzing said sample.

80. (New) A method according to claim 79, wherein patterning said columnar-void thin film is by: lithography comprising photolithography, probe, contact printing, imprinting, soft lithography; stamping; screen masking; printing or physically modifying said film or a subsequently positioned sample.

81. (New) A method according to claim 79 wherein said physical or chemical modifying comprises reaction with or adherence with organic or inorganic compounds, cells, cell components, tissues, microorganisms and mixtures thereof.

82. (New) A method according to claim 71, wherein analyzing said sample is by laser desorption-ionization, time of flight mass spectroscopy.

83. (New) A method according to claim 71, wherein prior to analyzing said sample, a signal enhancing agent is integrated with said sample.

84. (New) A method according to claim 83 wherein said signal enhancing agent is ammonium citrate.

85. (New) A method according to claim 71, wherein applying said sample to said continuous-void thin film is by either (a) absorbing from a solid, liquid or gas; or (b) directly applying to the surface of said deposited columnar-void thin film as a solid or liquid, or combination thereof.

86. (Amended) A method according to claim 85 wherein applying said sample to said columnar-void thin film is directly from, or integrated with, a chemical, physical, or electrical separation means, or combination thereof.

87. (New) A method according to claim 86 wherein said chemical, physical or electrical separation means is selected form the group consisting of liquid chromatography, gas chromatography, deposited thin film chromatography, size

exclusion chromatography, affinity chromatography, gel l ctrophoresis, capillary or micro-capillary electrophoresis, blotting, and combinations th reof.

88. (New) A method according to claim 87 wherein applying said sample to said columnar-void thin film directly from, or integrated with, a deposited thin film chromatography separation means further comprises the step of:

(c) applying said sample to said deposited thin film chromatography separation means;

(d) allowing the analytes of said sample to migrate through or to interact with said deposited thin film thereby separating component analytes in said sample, and thereafter applying said analytes of said sample to said continuous deposited thin film.

89. (New) A method according to claim 88 wherein the said deposited thin film is chemically or physically modified prior to separating component analytes in said sample.

90. (New) A method according to claim 71, wherein said deposited columnar-void thin film is deposited on a substrate selected form the group consisting of silicon, germanium, semiconductors, insulators, organic materials, glasses, plastics, polymers, metals, ceramics, and mixtures thereof.

91. (New) A method according to claim 71, wherein said deposited columnar-void thin film is deposited by chemical vapor deposition, physical vapor deposition, plasma enhanced chemical vapor deposition, hot wire deposition, evaporation, sputtering, casting, spin coating, nebulization, and combinations thereof.

92. (New) A method according to claim 71, wherein said deposited thin film is a semiconductor selected from the group consisting of silicon, germanium, and their alloys and compounds.

93. (New) A method according to claim 72, wherein said sample is a gas, liquid, solid, or combination thereof found in at least one environment selected from the group consisting of: the general indoor environment, general outdoor environment, a process environment, and equipment environment.

94. (New) A method according to claim 72, wherein said smple is a cell, plurality of cells, tissue, components thereof, and combinations thereof.

95. (New) A method for the analysis of a sample comprising:

(a) applying a sample on a deposited columnar thin film; and

(b) analyzing said sample by a detection means selected from the group consisting of radiation-driven desorption/ionization mass spectroscopy, antigen-antibody recognition reaction techniques, colorimetrc detection, atomic force microscopy, spectrographic analysis, enzyme reaction detection, electrical detection, chemical detection, and combinations thereof.

96. (New) A method according to claim 95, wherein said sample is selected from the group consisting of: organic chemical compositions, inorganic chemical compositions, biochemical compositions, drugs, drug metabolites, cells, cell components, micro-organisms, peptides, polypeptides, proteins, lipids, carbohydrates, nucleic acids, and mixtures thereof.

97. (New) A method according to claim 96, further comprising obtaining said sample from a fluidic system, a micro fluidic system, a nano fluidic system, a micro chromatographic system, a nano chromatographic system, a high-throughput isolation and preparation system, and combinations thereof.

98. (New) A method according to claim 95 wherein said deposited columnar film comprises (a) a network of columnar-like units; and (b) a substrate to which said network of columnar-like units is adhered.

99. (New) A method according to claim 95, wherein said deposited columnar thin film is selected from the group consisting of: semiconductors, insulators, organic materials, glasses, plastics, polymers, metals, ceramics and mixtures thereof.

100. (New) A method according to claim 95, further comprising the step of selecting said deposited columnar thin film using criteria selected form the group consisting of: laser-light reflection, optical absorption, sample species adsorption absorption and desorption, ambient adsorption absorption and desorption, and combinations thereof.

101. (New) A method according to claim 95, wherein said film is plasma deposited and the spacing, height, physical and chemical composition of said network of columnar-like units are varied by adjustment of the deposition parameters selected from the group consisting of: voltage, current, voltage between plasma and substrate, substrate temperature, plasma power, process pressure, electromagnetic fields in the vicinity of the substrate, deposition gases and flow rates, chamber conditioning, substrate surface, and combinations thereof.

102. (New) A method according to claim 95, further comprising modifying said deposited columnar thin film prior to analyzing said sample by at least one process selected from the group consisting of: oxidation, silicidation, etching, ion implantation, hydrogen implantation, nitridization, and combinations thereof.

103. (New) A method according to claim 95, further comprising, physically or chemically modifying, surface functionalizing, or patterning said columnar-void thin film prior to analyzing said sample.

104. (New) A m thod according to claim 103, wherein patt rning said columnar thin film is by: lithography comprising photolithography, probe, contact printing, imprinting, soft lithography; stamping; screen masking; printing or physically modifying said film or a subsequently positioned sample.

105. (New) A method according to claim 103 wherein said physical or chemical modifying comprises reaction with or adherence with at least one selected from the group consisting of: organic or inorganic compounds, cells, cell components, tissues, microorganisms and combinations thereof.

106. (New) A method according to claim 95, wherein analyzing said sample is by laser desorption-ionization, time of flight mass spectroscopy.

107. (New) A method according to claim 95, wherein prior to analyzing said sample, a signal enhancing agent is integrated with said sample.

108. (New) A method according to claim 107 wherein said signal enhancing agent is ammonium citrate.

109. (New) A method according to claim 95, wherein applying said sample to said continuous thin film is by either (a) absorbing from a solid, liquid or gas; or (b) directly applying to the surface of said deposited columnar-void thin film as a solid or liquid, or combination thereof.

110. (New) A method according to claim 109 wherein applying said sample to said columnar thin film is directly from, or integrated with, a chemical, physical, or electrical separation means, or combination thereof.

111. (New) A method according to claim 110 wherein said chemical, physical or electrical separation means is selected form the group consisting of liquid chromatography, gas chromatography, deposited thin film chromatography, size

exclusion chromatography, affinity chromatography, gel electrophoresis, capillary or micro-capillary electrophoresis, blotting, and combinations thereof.

112. (New) A method according to claim 111 wherein applying said sample to said columnar thin film directly from, or integrated with, a deposited thin film chromatography separation means further comprises the step of:

(a) applying said sample to said deposited thin film chromatography separation means;

(b) allowing the analytes of said sample to migrate through or to interact with said deposited thin film thereby separating component analytes in said sample, and thereafter applying said analytes of said sample to said continuous deposited thin film.

113. (New) A method according to claim 112 wherein the said deposited thin film is chemically or physically modified prior to separating component analytes in said sample.

114. (New) A method according to claim 95, wherein said deposited columnar thin film is deposited on a substrate selected from the group consisting of silicon, semiconductors, insulators, organic materials, glasses, plastics, polymers, metals, ceramics, and mixtures thereof.

115. (New) A method according to claim 95, wherein said deposited columnar thin film is deposited by chemical vapor deposition, physical vapor deposition, plasma enhanced chemical vapor deposition, hot wire deposition, evaporation, sputtering, casting, spin coating, and combinations thereof.

116. (New) A method according to claim 95, wherein said deposited thin film is a semiconductor selected from the group consisting of silicon, germanium and alloys and compounds thereof.

117. (New) A m thod according to claim 96, wherein said sample is a gas, liquid, solid, or combination thereof found in at least one environment selected from the group consisting of: the general indoor environment, general outdoor environment, a process environment, and equipment environment.

118. (New) A method according to claim 96, wherein said sample is a cell, plurality of cells, tissue, components thereof, and combinations thereof.